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US PAT NO: 5,543,266 [IMAGE AVAILABLE]
DATE FILED: Mar. 13, 1995

L6: 1 of 7

1. 5,543,266, Aug. 6, 1996, Active energy ray-curing resin composition; Hiromichi Noguchi, et al., 430/280.1; **347/65**; 522/15, 31, 102; 525/92B, 94, 118 [IMAGE AVAILABLE]

US PAT NO: 5,484,823 [IMAGE AVAILABLE]
DATE FILED: Aug. 29, 1994

L6: 2 of 7

2. 5,484,823, Jan. 16, 1996, Photopolymerizable adhesive for preventing peeling and separation at a joint section between first and second members of an ink jet printing head and a method of using the same; Hiromichi Noguchi, et al., 522/92; **347/63**; 522/102, 103, 121, 152, 153 [IMAGE AVAILABLE]

US PAT NO: 5,086,307 [IMAGE AVAILABLE]
DATE FILED: Feb. 13, 1991

L6: 3 of 7

3. 5,086,307, Feb. 4, 1992, Liquid jet recording head; Hiromichi Noguchi, et al., **347/65**; 430/286.1; 522/102; 525/75, 76, 77, 79 [IMAGE AVAILABLE]

US PAT NO: 4,839,669 [IMAGE AVAILABLE]
DATE FILED: Mar. 26, 1987

L6: 4 of 7

4. 4,839,669, Jun. 13, 1989, Liquid jet recording head; Yasufumi Sato, et al., **347/65**; 156/273.3; **347/20** [IMAGE AVAILABLE]

US PAT NO: 4,839,668 [IMAGE AVAILABLE]
DATE FILED: Mar. 26, 1987

L6: 5 of 7

5. 4,839,668, Jun. 13, 1989, Liquid jet recording head; Yasufumi Sato, et al., **347/65**; 156/273.3 [IMAGE AVAILABLE]

US PAT NO: 4,688,053 [IMAGE AVAILABLE]
DATE FILED: Jul. 8, 1986

L6: 6 of 7

6. 4,688,053, Aug. 18, 1987, Liquid jet recording head having a layer of a resin composition curable with an active energy ray; Hiromichi Noguchi, et al., **347/65**; 216/27, 83, 87; 430/281.1; 522/95, 102, 121, 149 [IMAGE AVAILABLE]

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US PAT NO: 5,543,266 [IMAGE AVAILABLE] L7: 1 of 2
ASSIGNEE: **Canon Kabushiki Kaisha**, Tokyo, Japan (foreign corp.)
US-CL-CURRENT: 430/280.1; **347/65**; 522/15, 31, 102; 525/92B, 94, 118

SUMMARY:

BSUM(12)

(i) . . . graft chains composed mainly of structural units derived from at least one monomer selected from the group consisting of (A) **hydroxyl** containing acrylic monomers, (B) amino or alkylamino containing acrylic monomers, (C) carboxyl containing acrylic or vinyl monomers, (D) N-vinylpyrrolidone or its. . .

SUMMARY:

BSUM(19)

In . . . monomers (A)-(F) to be used for constitution of the graft chains are shown below. Examples of the acrylic monomer containing **hydroxyl** group (s) of (A) include 2-hydroxyethyl(meth)acrylate [hereinafter, (meth)acrylate means to include both acrylate and methacrylate], 2-hydroxypropyl(meth)acrylate, 3-chloro-2-hydroxypropyl(meth)acrylate, 4-hydroxybutyl(meth)acrylate, 3-hydroxybutyl(meth)acrylate, 5-hydroxpentyl(meth)acrylate, . . .

SUMMARY:

BSUM(28)

j . . . of polyisocyanate having one isocyanate group and one or more acrylic ester groups in one molecule is reacted with the **hydroxyl** group, amino group or carboxyl group in the graft chain;

SUMMARY:

BSUM(29)

k the method in which acrylic acid chloride is reacted with the **hydroxyl** groups in the graft chain;

SUMMARY:

BSUM(30)

1 the method in which an acid anhydride is reacted with the **hydroxyl** group in the graft chain, followed by the reaction with glycidyl (meth)acrylate;

SUMMARY:

BSUM(31)

m the method in which the **hydroxyl** group in the graft chain is condensed with the condensing crosslinkable monomer as exemplified in (F), thereby leaving acrylamide group. . .

SUMMARY:

BSUM(32)

n the method in which the **hydroxyl** group in the graft chain is reacted with glycidyl (meth)acrylate; etc.

SUMMARY:

BSUM(41)

Specific . . . 500 to 3000 comprising dibasic acid and dihydric alcohol, d the reaction products between polyisocyanates and acrylic acid monomers having **hydroxyl** groups. The above monomers a-d may be urethane-modified products having urethane bonds in the molecules.

SUMMARY:

BSUM(45)

The . . . polyisocyanates, such as tolylene diisocyanate, isophorone diisocyanate, hexamethylene diisocyanate, trimethylhexamethylene diisocyanate, lysine diisocyanate, diphenylmethane diisocyanate or the like, with a **hydroxyl** containing acrylic monomer, and it is possible to use the reaction products having (meth)acrylic acid esters containing **hydroxyl** group(s) added to polyisocyanate compounds known under the trade names of Sumidule N (buret derivative of hexamethylene diisocyanate), Sumidule L (trimethylolpropane modified product of tolylene diisocyanate) (all produced by Sumitomo Bayer Urethane K.K.), etc. The **hydroxyl** containing acrylic monomer as herein mentioned may include typically (meth)acrylic acid esters, preferably hydroxyethyl (meth)acrylate, hydroxypropyl (meth)acrylate. It is also possible to use other acrylic monomers containing **hydroxyl** group(s) mentioned in the present specification as useful for the graft chains in the graft

/ copolymerized polymer.

SUMMARY:

BSUM(64)

In . . . Lewis acid as described above, it is also possible to employ, if desired, curing agents generally employed widely as the **curing** **agent** for epoxy resins, such as polyamine, polyamide, acid anhydride, boron trifluoride-amine complex, dicyandiamide, imidazoles, complexes of imidazole with metal, etc.

DETDESC:

DETD(4)

Celloxide 2021*.sup.2 25 parts by weight
Trimethylolpropane triacrylate 50 parts by weight
Triphenylsulfonium tetrafluoroborate 10 parts by weight
Irgacure 651 15 parts by weight
Crystal Violet 1 parts by weight
Hydroquinone 0.2 parts by weight
Methyl cellosolve acetate

DETDESC:

DETD(19)

Acrylic acid ester of triglycidyl 40 parts by weight
ether of trimethylolpropane
Diphenyliodonium tetrafluoroborate 10 parts by weight
Irgacure 651 15 parts by weight
Crystal Violet 1 parts by weight
Hydroquinone 0.2 parts by weight
Methyl cellosolve acetate

CLAIMS:

CLMS(1)

What . . .

graft chains composed mainly of structural units derived from at least one monomer selected from the group consisting of (A) **hydroxyl** containing acrylic monomers, (B) amino or alkylamino containing acrylic monomers, (C) carboxyl containing acrylic or vinyl monomers, (D) N-vinylpyrrolidone or. . . atoms, and R.² is hydrogen or an alkyl or acyl group having 1 to 4 carbon atoms which may have **hydroxyl** group, added to said trunk chain;
(ii) an epoxy resin selected from the group consisting of a bisphenol A epoxy resin, . . .

CLAIMS:

CLMS (3)

3. . . .
graft chains composed mainly of structural units derived from at least one monomer selected from the group consisting of (A) **hydroxyl** containing acrylic monomers, (B) amino or alkylamino containing acrylic monomers, (C) carboxyl containing acrylic or vinyl monomers, (D) N-vinylpyrrolidone or. . . atoms, and R.² is hydrogen or an alkyl or acyl group having 1 to 4 carbon atoms which may have **hydroxyl** group, added to said trunk chain;
(ii) a monomer having an ethylenically unsaturated bond;
(iii) an epoxy resin selected from the group. . .

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L1 15005 S E3
L2 41 S L1 AND IRGACURE
L3 20 S L2 AND 347/CLAS
L4 3 S L2 AND CURING AGENT
L5 17 S L2 AND HYDROXYL?
L6 7 S L5 AND L3
L7 2 S L6 AND L4
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US PAT NO:
ASSIGNEE:

4,688,053 [IMAGE AVAILABLE]

L4: 3 of 3

Canon Kabushiki Kaisha, Tokyo, Japan (foreign corp.)

DETDESC:

DETD(70)

In . . . Lewis acid as described above, it is also possible to employ, if desired, curing agents generally employed widely as the **curing** **agent** for epoxy resins, such as polyamine, polyamide, acid anhydride, boron trifluoride-amine complex, dicyandiamide, imidazoles, complexes of imidazole with metal, etc.

DETDESC:

DETD(152)

. . .
weight

Celloxide 2021*.sup.2

25 parts by weight

Trimethylolpropane 50 parts by weight
triacrylate

Triphenylsulfonium 10 parts by weight
tetrafluoroborate

Irgacure 651 15 parts by weight

Crystal Violet 1 parts by weight

Hydroquinone 0.2 parts by weight

Methyl cellosolve acetate

. . .
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1. 5,543,266, Aug. 6, 1996, Active energy ray-curing resin composition; Hiromichi Noguchi, et al., 430/280.1; 347/65; 522/15, 31, 102; 525/92B, 94, 118 [IMAGE AVAILABLE]

2. 5,476,752, Dec. 19, 1995, Active energy ray-curing resin composition; Hiromichi Noguchi, et al., 430/287.1; 522/31, 102, 126, 149; 525/92D, 94, 118, 922 [IMAGE AVAILABLE]

3. 4,688,053, Aug. 18, 1987, Liquid jet recording head having a layer of a resin composition curable with an active energy ray; Hiromichi Noguchi, et al., 347/65; 216/27, 83, 87; 430/281.1; 522/95, 102, 121, 149 [IMAGE AVAILABLE]

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'L3 20 L2 AND 347/CLAS

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US PAT NO: 5,543,266 [IMAGE AVAILABLE]
DATE FILED: Mar. 13, 1995

L3: 1 of 20

1. 5,543,266, Aug. 6, 1996, Active energy ray-curing resin composition; Hiromichi Noguchi, et al., 430/280.1; **347/65**; 522/15, 31, 102; 525/92B, 94, 118 [IMAGE AVAILABLE]

US PAT NO: 5,484,823 [IMAGE AVAILABLE]
DATE FILED: Aug. 29, 1994

L3: 2 of 20

2. 5,484,823, Jan. 16, 1996, Photopolymerizable adhesive for preventing peeling and separation at a joint section between first and second members of an ink jet printing head and a method of using the same; Hiromichi Noguchi, et al., 522/92; **347/63**; 522/102, 103, 121, 152, 153 [IMAGE AVAILABLE]

US PAT NO: 5,335,004 [IMAGE AVAILABLE]
DATE FILED: Mar. 12, 1992

L3: 3 of 20

3. 5,335,004, Aug. 2, 1994, Active energy-ray-curable resin composition, ink jet head having ink path wall formed by use of the composition, process for preparing the head, and ink jet apparatus provided with the head; Hirohide Matsuhisa, **347/65**; 216/27; 522/31, 170 [IMAGE AVAILABLE]

US PAT NO: 5,231,418 [IMAGE AVAILABLE]
DATE FILED: Dec. 1, 1992

L3: 4 of 20

4. 5,231,418, Jul. 27, 1993, Image recording method and apparatus; Toshiharu Inui, et al., **347/187** [IMAGE AVAILABLE]

US PAT NO: 5,148,193 [IMAGE AVAILABLE]
DATE FILED: Dec. 21, 1990

L3: 5 of 20

5. 5,148,193, Sep. 15, 1992, Method for surface treatment of ink jet recording head; Tadayoshi Inamoto, et al., **347/45**; 156/234, 275.5; 427/256 [IMAGE AVAILABLE]

US PAT NO: 5,086,307 [IMAGE AVAILABLE]
DATE FILED: Feb. 13, 1991

L3: 6 of 20

6. 5,086,307, Feb. 4, 1992, Liquid jet recording head; Hiromichi Noguchi, et al., **347/65**; 430/286.1; 522/102; 525/75, 76, 77, 79

[IMAGE AVAILABLE]

US PAT NO: 5,072,245 [IMAGE AVAILABLE] L3: 7 of 20
DATE FILED: Feb. 8, 1990

7. 5,072,245, Dec. 10, 1991, Image recording apparatus employing optical and heat energy to record image; Yasuyuki Tamura, et al., **347/212**; 250/318, 319; **347/217**; 399/318 [IMAGE AVAILABLE]

US PAT NO: 5,043,747 [IMAGE AVAILABLE] L3: 8 of 20
DATE FILED: Mar. 22, 1990

8. 5,043,747, Aug. 27, 1991, Head for ink set recording treated with an ink-repellant agent; Isao Ebisawa, et al., **347/45**; 549/559; 560/140 [IMAGE AVAILABLE]

US PAT NO: 5,005,028 [IMAGE AVAILABLE] L3: 9 of 20
DATE FILED: Sep. 8, 1988

9. 5,005,028, Apr. 2, 1991, Image forming method and transfer recording medium therefor; Yasuyuki Tamura, et al., **347/171** [IMAGE AVAILABLE]

US PAT NO: 4,978,968 [IMAGE AVAILABLE] L3: 10 of 20
DATE FILED: Jun. 19, 1989

10. 4,978,968, Dec. 18, 1990, Image recording apparatus; Noriyoshi Ishikawa, et al., **347/217**, **222**, **224**; 355/27; 430/138 [IMAGE AVAILABLE]

US PAT NO: 4,963,895 [IMAGE AVAILABLE] L3: 11 of 20
DATE FILED: Jan. 19, 1989

11. 4,963,895, Oct. 16, 1990, Illumination/recording system with movable fluorescent substances; Toshiaki Harada, et al., **347/232**, **238**; 358/509; 362/223 [IMAGE AVAILABLE]

US PAT NO: 4,952,944 [IMAGE AVAILABLE] L3: 12 of 20
DATE FILED: Sep. 28, 1988

12. 4,952,944, Aug. 28, 1990, Transfer recorder with heater; Toshiharu Inui, et al., 346/25; **347/224**; 399/324 [IMAGE AVAILABLE]

US PAT NO: 4,899,175 [IMAGE AVAILABLE] L3: 13 of 20
DATE FILED: Nov. 5, 1987

13. 4,899,175, Feb. 6, 1990, Recording system with illumination means utilizing a plurality of fluorescent substances; Toshiaki Harada, et al.,

347/238, **232**; 358/509; 396/548 [IMAGE AVAILABLE]

US PAT NO: 4,891,652 [IMAGE AVAILABLE]
DATE FILED: Mar. 5, 1987

L3: 14 of 20

14. 4,891,652, Jan. 2, 1990, Image recording apparatus using plural types of energy and reversible transfer recording medium conveyance; Tadashi Sato, et al., **347/219**, **171**, **217**, **221**; 400/582 [IMAGE AVAILABLE]

US PAT NO: 4,888,601 [IMAGE AVAILABLE]
DATE FILED: Nov. 24, 1987

L3: 15 of 20

15. 4,888,601, Dec. 19, 1989, Image recording apparatus and method; Toshiharu Inui, **347/212**; 101/487; **347/217**; 399/328 [IMAGE AVAILABLE]

US PAT NO: 4,887,095 [IMAGE AVAILABLE]
DATE FILED: Mar. 17, 1987

L3: 16 of 20

16. 4,887,095, Dec. 12, 1989, Image recording apparatus using several types of energy and recording process; Masafumi Wataya, et al., **347/218**, **221** [IMAGE AVAILABLE]

US PAT NO: 4,839,669 [IMAGE AVAILABLE]
DATE FILED: Mar. 26, 1987

L3: 17 of 20

17. 4,839,669, Jun. 13, 1989, Liquid jet recording head; Yasufumi Sato, et al., **347/65**; 156/273.3; **347/20** [IMAGE AVAILABLE]

US PAT NO: 4,839,668 [IMAGE AVAILABLE]
DATE FILED: Mar. 26, 1987

L3: 18 of 20

18. 4,839,668, Jun. 13, 1989, Liquid jet recording head; Yasufumi Sato, et al., **347/65**; 156/273.3 [IMAGE AVAILABLE]

US PAT NO: 4,688,053 [IMAGE AVAILABLE]
DATE FILED: Jul. 8, 1986

L3: 19 of 20

19. 4,688,053, Aug. 18, 1987, Liquid jet recording head having a layer of a resin composition curable with an active energy ray; Hiromichi Noguchi, et al., **347/65**; 216/27, 83, 87; 430/281.1; 522/95, 102, 121, 149 [IMAGE AVAILABLE]

US PAT NO: 4,688,052 [IMAGE AVAILABLE]
DATE FILED: Jul. 8, 1986

L3: 20 of 20

20. 4,688,052, Aug. 18, 1987, Liquid jet recording head having a layer
of a resin composition curable with an active energy ray; Tadayoshi
Inamoto, et al., **347/65**; 216/27, 83, 87; 430/281.1; 522/14, 31, 102
[IMAGE AVAILABLE]

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L1 15005 S E3
L2 41 S L1 AND IRGACURE
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